APPENDIX G:

DATA IN SUPPORT OF AIR QUALITY ANALYSIS

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G.1 INTRODUCTION

This appendix contains information and analysis related to the assessment of air quality impacts of the various alternatives considered. Table G-1 contains a summary of the power plant emissions used in air modeling. The values in this table are conservative in that they assume operation of the plant at maximum capacity 100% of the time. Also, in many cases, values are for maximum permitted or guaranteed emission rates rather than for expected emission rates, which are typically lower.

Tables G-2 and G-3 present the most recent available regional emission rates for criteria pollutants and ozone (O_3) precursors in Imperial County and in Mexicali. These data were drawn upon to generate the emission rates for volatile organic compounds (VOC), nitrogen oxides (NO_x), and carbon monoxide (CO) presented in Table G-4, which were used in the O_3 modeling for this environmental impact statement. The results of a sensitivity analysis of O_3 modeling that used the U.S. Environmental Protection Agency's Ozone Isopleth Plotting Program Revised (OZIPR) model are presented in Table G-5. A discussion of the results of the sensitivity analysis is presented in association with these results.

TABLE G-1 Sempra and LRPC Power Plant Emission and Air Modeling Input Data[a]

	Intergen LRPC Plant			Sempra TDM Plant	
	Value				
Parameter	EBC (1 gas turbine to 1 steam turbine)	EAX (3 gas turbines to 1 steam turbine)	Source/Basis	Value	Source/Basis
NO_2 concentration	3.5 ppm	25 ppm no SCR; 2.5 ppm when SCR added	Vendor guarantee; Intergen 2/5/04	2.5 ppm	Vendor guarantee and permit limit; Sempra 1/12/04
NO_2 mass rate	31.08 lb/h (136 tons/yr)	218 lb/h (955 tons/yr) no SCR; 21.8 lb/h when SCR added	Intergen 2/5/04	9.7 kg/h as NO_2 for each unit, 19.4 kg/h (187 tons/yr) for both units	Sempra 2/6/04
	Total: 3,000 tons/yr for all 4 units				
CO concentration	30 ppm	30 ppm	Vendor guarantee	4 ppm	Vendor guarantee and permit limit; Sempra 1/12/04
CO mass rate	166 lb/h (727 tons/yr)	498 lb/h (assume 3 × EBC)	EBC mass rate Sempra; EAX = 3 × EBC	9.4 kg/h for each unit, 18.8 kg/h (181 tons/yr) for both units	Sempra 2/6/04
	Total: 664 lb/h (2,908 tons/yr) for all 4 units				
PM_{10} mass rate (stacks only)	52.3 lb/h (229 tons/yr)	156.9 lb/h (3 × EBC)	Intergen 2/5/04 EBC); EAX = 3 × EBC	12.3 kg/h for each unit, 24.6 kg/h (237 tons/yr) for both units	Sempra 2/6/04
	Total: 209.2 lb/h (916 tons/yr) all 4 units				
PM_{10} cooling towers	9.4 tons/yr	28.2 tons/yr	Estimate based on Blythe II	18.8 tons/yr	Assume same as Blythe II
	Total: 37.6 tons/yr				
$PM_{2.5}$	Assume same as PM_{10}	Assume same as PM_{10}	Intergen 2/05/04	Assume same as PM_{10}	Sempra 1/30/04
SO_2	0.20 grain/100 SCF, and 0.008% H_2S (by volume)		Intergen 2/5/04	0.20 grain/100 SCF, and 0.008% H_2S (by volume)	Assume same factor as Intergen
VOC	0.02 lb/MMBtu	0.02 lb/MMBtu	Intergen 2/5/04	384 tons/yr (based on 0.02 lb/MMBtu)	Assume same factor as Intergen
NH_3 concentration	10 ppm	5 ppm (when SCR added)	Vendor guarantee	10 ppmv per day	Vendor guarantee; Sempra 1/12/04

TABLE G-1 (Cont.)

Parameter	Intergen LRPC Plant			Sempra TDM Plant	
	Value		Source/Basis		
	EBC (1 gas turbine to 1 steam turbine)	EAX (3 gas turbines to 1 steam turbine)		Value	Source/Basis
NH_3 mass rate	33.8 lb/h (148 tons/yr)	50.7 lb/h (222 tons/yr)	Intergen 2/5/04 EBC; EAX = 3/2 × EBC	276 tons/yr (28.6 kg/h for 8,760 h/yr operation, total for both units)	Sempra 1/12/04
	Total: 85.5 lb/h (370 tons/yr when all 4 units equipped)				
CO_2	296,000 lb/h (1.3 million tons/yr)	888,000 lb/h (3.9 million tons/yr)	Intergen 2/5/04	849 lb/MWh (679.7 MW), or 2.5 million tons/yr (both units)	Sempra 1/12/04
	Total: 5.2 million tons/yr				
Gas consumption	Total for LRPC: 68.5 million MMBtu/yr		Intergen 1/29/04	38.4 million MMBtu/yr	Sempra 1/12/04
Stack height	56 m	56 m	DOE 2001	60 m	Sempra 1/12/04
Stack diameter	5.49 m	5.49 m	Intergen 2/5/04	5.79 m	Sempra 1/12/04
Stack flow rate	21.0 m/s	21.0 m/s	Intergen 2/5/04	1,711,200 m^3/h	Sempra 2/6/04
Stack temperature	77°C	77°C	Intergen 2/5/04	85°C	Sempra 1/12/04
Meteorological data	Imperial County		Database	Imperial County	Database

[a] Abbreviations: CO = carbon monoxide; CO_2 = carbon dioxide; EAX = Energiá Azteca X, S. de R.L. de C.V.; EBC = Energiá de Baja California; MMBtu = million British thermal units; NH_3 = ammonia; NO_2 = nitrogen dioxide; $PM_{2.5}$ = particulate matter with a mean aerodynamic diameter of 2.5 µm or less; PM_{10} = particulate matter with a mean aerodynamic diameter of 10 µm or less; ppm = part(s) per million; SCR = selective catalytic reduction (system); SO_2 = sulfur dioxide; and VOC = volatile organic compound(s).

TABLE G-2 Estimated Annual Average Emissions for 2003 in Imperial County

Air Resources Board

Almanac Emission Projection Data (published in 2004)

2003 Estimated Annual Average Emissions

IMPERIAL COUNTY

All emissions are represented in Tons per Day and reflect the most current data provided to ARB.
Download these results (as a comma delimited file).
Download more detailed data (as a comma delimited file).
Start a new query.

STATIONARY SOURCES	TOG	ROG	CO	NOX	SOX	PM	PM10	PM2.5
FUEL COMBUSTION								
ELECTRIC UTILITIES	0.33	0.04	0.19	0.78	0.06	0.09	0.04	0.04
MANUFACTURING AND INDUSTRIAL	0.10	0.05	0.49	4.70	0.06	0.30	0.27	0.25
FOOD AND AGRICULTURAL PROCESSING	0.05	0.04	0.04	0.55	-	0.03	0.02	0.02
SERVICE AND COMMERCIAL	0.05	0.02	0.13	0.68	0.00	0.07	0.07	0.07
OTHER (FUEL COMBUSTION)	0.02	0.01	0.03	0.16	0.00	0.01	0.01	0.01
*** TOTAL FUEL COMBUSTION**	**0.54**	**0.17**	**0.88**	**6.87**	**0.13**	**0.50**	**0.41**	**0.39**
WASTE DISPOSAL								
OTHER (WASTE DISPOSAL)	0.02	0.02	-	-	-	-	-	-
*** TOTAL WASTE DISPOSAL**	**0.02**	**0.02**	-	-	-	-	-	-
CLEANING AND SURFACE COATINGS								
LAUNDERING	0.04	0.01	-	-	-	-	-	-
DEGREASING	0.23	0.20	-	-	-	-	-	-
COATINGS AND RELATED PROCESS SOLVENTS	0.91	0.87	-	-	-	-	-	-
ADHESIVES AND SEALANTS	0.07	0.06	-	-	-	-	-	-
*** TOTAL CLEANING AND SURFACE COATINGS**	**1.25**	**1.13**	-	-	-	-	-	-
PETROLEUM PRODUCTION AND MARKETING								
PETROLEUM REFINING	0.00	0.00	-	-	-	-	-	-
PETROLEUM MARKETING	0.81	0.80	-	0.00	-	-	-	-
OTHER (PETROLEUM PRODUCTION AND MARKETING)	0.01	0.01	-	-	-	-	-	-
*** TOTAL PETROLEUM PRODUCTION AND MARKETING**	**0.82**	**0.81**	-	**0.00**	-	-	-	-
INDUSTRIAL PROCESSES								
FOOD AND AGRICULTURE	-	-	-	0.00	-	0.42	0.16	0.04
MINERAL PROCESSES	0.01	0.01	0.04	0.01	0.01	4.91	2.57	1.07
METAL PROCESSES	-	-	-	-	-	0.00	0.00	-
OTHER (INDUSTRIAL PROCESSES)	0.07	0.06	0.02	0.02	0.02	0.00	0.00	0.00
*** TOTAL INDUSTRIAL PROCESSES**	**0.07**	**0.07**	**0.06**	**0.03**	**0.03**	**5.32**	**2.73**	**1.11**
**** TOTAL STATIONARY SOURCES**	**2.70**	**2.20**	**0.94**	**6.90**	**0.16**	**5.82**	**3.14**	**1.51**
AREA-WIDE SOURCES	**TOG**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**PM10**	**PM2.5**
SOLVENT EVAPORATION								
CONSUMER PRODUCTS	1.46	1.22	-	-	-	-	-	-
ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS	0.61	0.60	-	-	-	-	-	-
PESTICIDES/FERTILIZERS	4.01	4.01	-	-	-	-	-	-

TABLE G-2 (Cont.)

ASPHALT PAVING / ROOFING	1.71	1.71	-	-	-	-	-	-
*** TOTAL SOLVENT EVAPORATION**	**7.79**	**7.54**	-	-	-	-	-	-
MISCELLANEOUS PROCESSES								
RESIDENTIAL FUEL COMBUSTION	0.09	0.04	0.64	0.10	0.00	0.09	0.09	0.08
FARMING OPERATIONS	118.39	9.47	-	-	-	27.85	12.99	2.25
CONSTRUCTION AND DEMOLITION	-	-	-	-	-	3.85	1.89	0.39
PAVED ROAD DUST	-	-	-	-	-	8.72	3.99	0.67
UNPAVED ROAD DUST	-	-	-	-	-	55.39	32.92	6.98
FUGITIVE WINDBLOWN DUST	-	-	-	-	-	339.18	172.79	37.53
FIRES	0.00	0.00	0.03	0.00	-	0.00	0.00	0.00
WASTE BURNING AND DISPOSAL	2.14	1.08	12.02	0.28	0.03	2.22	2.18	2.08
COOKING	0.03	0.02	-	-	-	0.08	0.06	0.04
*** TOTAL MISCELLANEOUS PROCESSES**	**120.66**	**10.61**	**12.69**	**0.38**	**0.03**	**437.39**	**226.90**	**50.03**
**** TOTAL AREA-WIDE SOURCES**	**128.45**	**18.16**	**12.69**	**0.38**	**0.03**	**437.39**	**226.90**	**50.03**
MOBILE SOURCES	**TOG**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**PM10**	**PM2.5**
ON-ROAD MOTOR VEHICLES								
LIGHT DUTY PASSENGER (LDA)	3.56	3.26	29.73	2.80	0.01	0.08	0.08	0.05
LIGHT DUTY TRUCKS - 1 (LDT1)	1.58	1.46	15.44	1.34	0.01	0.03	0.03	0.02
LIGHT DUTY TRUCKS - 2 (LDT2)	1.13	1.03	10.92	1.18	0.00	0.03	0.03	0.02
MEDIUM DUTY TRUCKS (MDV)	0.48	0.44	4.49	0.52	0.00	0.01	0.01	0.01
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	0.19	0.18	1.15	0.12	0.00	0.00	0.00	0.00
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.03	0.03	0.23	0.04	-	-	-	-
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	0.37	0.35	2.65	0.20	-	-	-	-
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	0.22	0.20	2.83	0.36	-	-	-	-
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.01	0.01	0.02	0.15	0.00	0.00	0.00	0.00
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.01	0.00	0.01	0.07	0.00	0.00	0.00	0.00
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.02	0.02	0.14	0.66	0.01	0.02	0.02	0.02
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	0.41	0.36	1.64	6.35	0.06	0.19	0.19	0.16
MOTORCYCLES (MCY)	0.08	0.08	0.49	0.01	-	-	-	-
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.01	0.01	0.04	0.20	0.00	0.00	0.00	0.00
HEAVY DUTY GAS URBAN BUSES (UB)	0.21	0.17	1.79	0.13	-	-	-	-
SCHOOL BUSES (SB)	0.03	0.02	0.39	0.08	0.00	0.00	0.00	0.00
MOTOR HOMES (MH)	0.08	0.07	1.79	0.11	-	-	-	-
*** TOTAL ON-ROAD MOTOR VEHICLES**	**8.40**	**7.68**	**73.75**	**14.31**	**0.09**	**0.38**	**0.38**	**0.29**
OTHER MOBILE SOURCES								
AIRCRAFT	2.55	2.28	8.39	1.75	0.26	0.16	0.16	0.16
TRAINS	0.51	0.45	1.61	7.95	0.72	0.24	0.24	0.22
RECREATIONAL BOATS	0.45	0.41	4.56	0.21	0.00	0.02	0.02	0.02
OFF-ROAD RECREATIONAL VEHICLES	0.10	0.09	1.21	0.03	0.00	0.00	0.00	0.00
OFF-ROAD EQUIPMENT	0.70	0.63	5.84	1.63	0.00	0.12	0.11	0.10
FARM EQUIPMENT	0.37	0.33	2.20	2.28	0.02	0.15	0.15	0.14
FUEL STORAGE AND HANDLING	0.22	0.22	-	-	-	-	-	-
*** TOTAL OTHER MOBILE SOURCES**	**4.89**	**4.41**	**23.81**	**13.85**	**1.00**	**0.70**	**0.69**	**0.64**
**** TOTAL MOBILE SOURCES**	**13.29**	**12.09**	**97.55**	**28.16**	**1.09**	**1.07**	**1.06**	**0.92**
GRAND TOTAL FOR IMPERIAL	**144.44**	**32.44**	**111.19**	**35.45**	**1.28**	**444.28**	**231.10**	**52.46**

Start a new query.
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Source: California Air Resources Board, 2003. Available at http://www.arb.ca.gov/ei/maps/statemap/cntymap.htm.

TABLE G-3 Summary of Regional Emissions Inventories in the Six Northern Mexico States

Total 1999 Emissions Inventory for the Six Northern Mexican States (Final)
Mg/Year, by State, By Municipality
Excludes Natural Sources

State	Municipality	NO_x	SO_x	VOC	CO	PM_{10}	$PM_{2.5}$	NH_3
Baja California	Ensenada	7,761.7	1,789.0	16,692.9	17,352.3	14,874.8	3,641.6	3,629.2
Baja California	Mexicali	8,671.1	5,835.0	22,078.4	51,331.2	32,458.1	8,724.4	5,446.2
Baja California	Tecate	551.8	590.4	2,144.5	2,495.6	2,627.7	500.0	88.2
Baja California	Tijuana	12,879.7	9,789.0	41,802.8	87,057.1	65,012.6	12,490.9	1,127.2
Baja California	Playas de Rosarito	6,580.5	24,134.5	2,737.6	4,259.5	3,957.8	2,214.8	71.9
Total - State		***36,444.7***	***42,137.9***	***85,456.2***	***162,495.6***	***118,931.0***	***27,571.8***	***10,362.6***
Coahuila	Abasolo	100.9	10.5	43.2	156.0	79.3	29.1	81.6
Coahuila	Acuña	1,005.2	813.5	3,969.3	5,947.5	5,445.4	1,016.9	1,247.8
Coahuila	Allende	132.9	60.6	394.1	562.8	1,030.2	176.9	138.8
Coahuila	Arteaga	114.8	39.1	437.7	1,145.1	833.8	198.8	369.7
Coahuila	Candela	280.7	38.6	90.6	256.1	151.3	65.5	185.0
Coahuila	Castaños	574.5	151.3	768.8	910.5	1,196.3	268.1	361.4
Coahuila	Cuatrociénegas	324.4	119.7	251.9	507.1	862.4	243.1	278.4
Coahuila	Escobedo	83.8	4.0	55.2	135.4	144.7	30.9	201.4
Coahuila	Francisco I. Madero	239.2	58.2	707.0	1,261.9	1,553.1	279.8	1,144.4
Coahuila	Frontera	920.4	361.8	2,254.1	4,166.2	2,532.1	616.9	132.9
Coahuila	General Cepeda	291.7	17.5	276.1	740.3	628.9	149.9	797.1
Coahuila	Guerrero	164.3	21.3	66.9	167.1	137.5	45.5	783.4
Coahuila	Hidalgo	143.9	20.3	96.5	141.4	273.3	74.9	384.8
Coahuila	Jiménez	1,216.0	156.3	497.6	1,417.9	643.5	230.9	605.3
Coahuila	Juárez	16.7	1.7	57.1	59.5	116.6	23.2	257.5
Coahuila	Lamadrid	33.1	6.8	35.1	72.0	89.9	19.3	58.0
Coahuila	Matamoros	315.8	72.8	1,243.3	2,333.7	3,064.6	534.9	2,577.4
Coahuila	Monclova	8,711.2	4,035.7	5,792.3	12,546.4	15,342.7	9,366.1	462.3
Coahuila	Morelos	337.6	59.0	190.5	401.0	413.0	112.5	242.3
Coahuila	Múzquiz	571.1	346.6	1,093.4	1,907.5	2,105.5	403.2	1,329.1
Coahuila	Nadadores	109.3	10.7	106.2	257.7	306.1	65.7	159.7
Coahuila	Nava	103,926.9	151,139.2	555.4	3,104.2	9,314.2	8,233.1	336.6
Coahuila	Ocampo	753.9	158.1	351.8	1,365.1	795.5	227.4	854.9
Coahuila	Parras	957.3	134.2	992.5	2,107.0	1,674.2	399.0	911.0
Coahuila	Piedras Negras	1,157.7	589.5	4,436.2	6,722.3	6,206.5	1,172.0	329.6
Coahuila	Progreso	114.6	29.7	89.2	172.4	221.6	47.4	322.3
Coahuila	Ramos Arizpe	2,493.3	569.8	3,741.6	7,503.2	1,782.7	579.4	1,087.1
Coahuila	Sabinas	386.1	241.7	1,273.5	1,381.5	1,940.3	418.4	535.6
Coahuila	Sacramento	17.6	2.9	34.2	82.9	101.1	19.9	82.9
Coahuila	Saltillo	5,570.8	1,888.4	15,573.9	43,156.2	23,927.7	7,447.0	1,639.4
Coahuila	San Buenaventura	71.9	14.1	300.5	574.1	966.6	165.8	751.6
Coahuila	San Juan de Sabinas	371.7	963.7	749.6	1,120.1	1,402.8	262.8	194.1
Coahuila	San Pedro	741.0	157.4	1,486.1	2,939.3	3,166.7	643.6	931.6
Coahuila	Sierra Mojada	420.8	35.8	144.1	332.3	324.1	81.8	321.1
Coahuila	Torreón	4,849.2	4,141.2	12,885.2	39,447.7	19,748.9	4,139.2	3,672.6
Coahuila	Viesca	1,731.7	231.5	847.2	2,465.1	1,163.9	374.4	1,185.9
Coahuila	Villa Unión	126.2	15.6	117.8	206.8	317.4	61.5	486.3
Coahuila	Zaragoza	153.8	29.9	281.0	454.6	630.9	119.0	1,416.4
Total - State		***139,531.9***	***166,748.6***	***62,286.6***	***148,227.9***	***110,637.5***	***38,344.0***	***26,877.3***
Chihuahua	Ahumada	491.5	53.1	245.2	418.7	628.4	127.1	987.0
Chihuahua	Aldama	610.8	43.1	349.3	689.0	983.2	197.4	885.2
Chihuahua	Allende	125.0	7.2	146.6	301.3	467.7	85.3	221.7
Chihuahua	Aquiles Serdán	38.7	4.0	60.9	174.4	253.6	45.2	38.0
Chihuahua	Ascensión	465.0	95.8	448.9	1,079.9	1,188.6	255.5	1,105.2
Chihuahua	Bachiniva	57.6	6.8	145.1	307.0	413.1	89.8	533.1
Chihuahua	Balleza	251.2	33.9	507.7	1,714.7	1,074.8	317.5	887.5
Chihuahua	Batopilas	65.9	11.2	387.6	1,364.3	753.4	236.2	299.6
Chihuahua	Bocoyna	289.1	57.9	910.3	2,949.3	1,253.4	436.6	359.4
Chihuahua	Buenaventura	1,706.5	317.4	677.8	1,859.8	1,339.6	472.9	1,004.4
Chihuahua	Camargo	508.4	224.1	817.0	1,521.4	2,279.4	987.1	2,452.1
Chihuahua	Carichí	107.0	13.4	256.7	862.0	530.5	156.2	545.7
Chihuahua	Casas Grandes	191.1	7.5	348.0	1,354.5	607.9	199.4	797.9
Chihuahua	Coronado	157.1	21.2	68.8	206.1	148.3	47.9	240.5
Chihuahua	Coyame del Sotol	135.3	17.5	58.5	156.9	110.1	38.6	639.7
Chihuahua	La Cruz	159.1	14.5	73.7	211.7	210.2	51.6	178.3
Chihuahua	Cuauhtémoc	931.9	480.8	2,481.6	4,219.7	6,345.4	1,278.0	2,836.7
Chihuahua	Cusihuiriachi	28.7	2.2	142.8	253.4	477.4	100.6	1,131.5
Chihuahua	Chihuahua	10,745.3	9,414.2	18,561.0	58,745.3	24,990.0	6,229.0	3,136.8
Chihuahua	Chínipas	47.1	3.8	252.5	1,006.0	443.4	156.9	236.0
Chihuahua	Delicias	4,565.3	39,197.4	2,847.4	4,904.1	8,079.1	3,414.1	1,193.5
Chihuahua	Dr. Belisario Dominguez	52.4	6.2	74.4	182.3	217.5	47.0	256.0
Chihuahua	Galeana	273.1	39.8	106.7	335.1	241.3	81.1	224.4
Chihuahua	Santa Isabel	78.9	11.4	90.2	198.6	297.6	63.8	138.9
Chihuahua	Gómez Farias	106.3	51.6	251.3	543.9	567.3	133.7	341.9
Chihuahua	Gran Morelos	65.6	11.8	81.0	183.3	230.0	51.2	152.1

TABLE G-3 (Cont.)

Natural Sources
1999 Emissions Inventory for the Six Northern States (Final)
Mg/Year, by Municipality

State	Municipality	NO_x	SO_x	VOC	CO	PM_{10}	$PM_{2.5}$
Baja California	Ensenada	1,267.0		5,401.5			
Baja California	Méxicali	2,021.8		10,367.5			
Baja California	Tecate	1,009.1		2,600.1			
Baja California	Tijuana	118.4		213.3			
Baja California	Playas de Rosarito	36.5		62.1			
Total - State		***4,452.8***	***0.0***	***18,644.6***	***0.0***	***0.0***	***0.0***
Coahuila	Abasolo	298.1		2,791.0			
Coahuila	Acuña	4,252.5		24,563.1			
Coahuila	Allende	232.0		497.4			
Coahuila	Arteaga	873.9		5,522.6			
Coahuila	Candela	805.5		5,024.2			
Coahuila	Castaños	1,219.4		5,741.1			
Coahuila	Cuatrociénegas	3,998.7		25,902.4			
Coahuila	Escobedo	405.5		1,521.4			
Coahuila	Francisco I. Madero	2,297.0		5,836.3			
Coahuila	Frontera	333.4		1,040.7			
Coahuila	General Cepeda	678.0		2,848.3			
Coahuila	Guerrero	1,430.2		4,152.1			
Coahuila	Hidalgo	880.5		3,044.0			
Coahuila	Jiménez	1,772.1		3,728.6			
Coahuila	Juárez	421.9		1,430.1			
Coahuila	Lamadrid	322.8		1,780.7			
Coahuila	Matamoros	835.1		1,009.6			
Coahuila	Monclova	928.2		2,136.2			
Coahuila	Morelos	194.1		393.0			
Coahuila	Múzquiz	3,680.3		46,038.7			
Coahuila	Nadadores	293.1		905.9			
Coahuila	Nava	698.9		2,715.7			
Coahuila	Ocampo	6,988.3		84,016.2			
Coahuila	Parras	3,151.1		30,363.5			
Coahuila	Piedras Negras	466.8		1,284.1			
Coahuila	Progreso	880.1		2,458.1			
Coahuila	Ramos Arizpe	1,724.3		4,860.2			
Coahuila	Sabinas	1,092.8		3,592.0			
Coahuila	Sacramento	67.7		2,833.0			
Coahuila	Saltillo	2,044.3		12,286.0			
Coahuila	San Buenaventura	2,768.5		10,946.1			
Coahuila	San Juan de Sabinas	354.8		1,145.8			
Coahuila	San Pedro	5,778.8		20,446.1			
Coahuila	Sierra Mojada	1,107.5		15,309.2			
Coahuila	Torreón	537.1		970.0			
Coahuila	Viesca	3,088.7		4,470.3			
Coahuila	Villa Unión	1,547.1		2,879.0			
Coahuila	Zaragoza	3,632.0		29,590.8			
Total - State		***62,081.1***	***0.0***	***376,073.7***	***0.0***	***0.0***	***0.0***
Chihuahua	Ahumada	1,331.2		41,097.5			
Chihuahua	Aldama	1,461.5		13,400.4			
Chihuahua	Allende	369.3		1,910.3			
Chihuahua	Aquiles Serdán	281.3		630.3			
Chihuahua	Ascensión	1,208.2		44,850.1			
Chihuahua	Bachíniva	685.7		8,133.2			
Chihuahua	Balleza	570.5		103,864.4			
Chihuahua	Batopilas	229.8		43,305.6			
Chihuahua	Bocoyna	387.9		40,315.2			
Chihuahua	Buenaventura	1,184.7		36,716.8			
Chihuahua	Camargo	1,159.1		19,305.6			
Chihuahua	Carichí	728.2		54,143.5			
Chihuahua	Casas Grandes	563.6		72,947.6			
Chihuahua	Coronado	437.2		3,398.7			
Chihuahua	Coyame del Sotol	1,232.2		14,291.6			
Chihuahua	La Cruz	346.6		2,625.4			
Chihuahua	Cuauhtémoc	3,380.2		49,689.4			
Chihuahua	Cusihuiriachi	1,366.1		13,221.2			
Chihuahua	Chihuahua	2,080.6		92,759.1			
Chihuahua	Chínipas	125.5		23,920.6			
Chihuahua	Delicias	170.9		564.8			
Chihuahua	Dr. Belisario Domínguez	309.3		7,043.3			
Chihuahua	Galeana	373.8		11,952.3			
Chihuahua	Santa Isabel	659.4		4,740.7			
Chihuahua	Gómez Farías	444.3		10,486.2			
Chihuahua	Gran Morelos	316.3		7,256.6			

Source: ERG, Acosta y Asociados, and TransEngineering, 2004, *Mexico National Emissions Inventory, 1999; Six Northern States, Final,* April 30.

G.2 SENSITIVITY ANALYSIS OF OZONE MODELING USING THE OZIPR MODEL

Simulation of O_3 formation and transport is a highly complex and resource-intensive exercise. Regulatory agencies are encouraged to use three-dimensional Eulerian photochemical grid models, such as the Models-3/Community Multiscale Air Quality (CMAQ) model, to evaluate the relationship between precursor emissions and O_3. As a choice of models to complement photochemical grid models, the Empirical Kinetic Modeling Approach (EKMA), which is implemented by the OZIPR model, may be used to help select strategies for simulation with a photochemical grid model and to corroborate results obtained with a grid model. Considering the magnitude of O_3 precursor emissions in the area, ambient O_3 impacts from the power plants are expected to be small. Accordingly, a screening type of model meets the needs of the objectives of this environmental impact statement (EIS); namely, to understand the nature and general magnitude of impacts of plant operations on O_3 production in the region. An analysis of the sensitivity of the results of the model to changes in inputs has been performed, and the model performance has been determined to meet the needs of this analysis. The sensitivity analysis is discussed below.

These simulations are based on annual total emissions (no information on detailed seasonal/daily/diurnal patterns) and typical average meteorological conditions for the region. The OZIPR model is a simple one-dimensional photochemical box model that cannot adequately account for the complex nature of the atmosphere and the behaviors of pollutants (meteorology, emissions, transport, deposition, etc.). Accordingly, these results indicate the average direction and magnitude of the expected influence of the power plant emissions on peak O_3 concentrations. Results should be interpreted with caution.

To determine the relative importance of the major model input parameters, several OZIPR sensitivity runs were made. Various values for model inputs were selected to encompass the full range of reasonably expected conditions for the study area. As described in the discussion of O_3 formation in Section 4.3.4 of the main text, because data for ambient VOC concentrations and speciation are not available for the study area, values for Phoenix, Arizona, from the OZIPR database were considered the best available and were used. Model inputs were varied as follows:

- Base case: Modeling area of 154 mi^2 (400 km^2) and meteorological conditions for Phoenix (Phx_sum1) of T_{max} = 105.1°F (40.6°C), RH = 15 to 28%, mixing height = 4,029 to 14,459 ft (1,228 to 4,407 m);

- Modeling area of 77 mi^2 (200 km^2) (same as doubled emission rates);

- Modeling area of 309 mi^2 (800 km^2) (same as halved emission rates);

- Meteorological conditions for Phoenix (Phx_sum2) of T_{max} = 100.0°F (37.8°C), RH = 26 to 45%, mixing height = 7,238 (morning) to 11,280 ft (afternoon) (2,206 to 3,438 m);

- Meteorological conditions for Phoenix (Phx_sum3) of T_{max} = 110.5°F (43.6°C), RH = 9.5 to 19%, mixing height = 925 (morning) to 18,960 ft (afternoon) (282 to 5,779 m);

- VOC speciation for Los Angeles; and

- VOC speciation for Houston.

The base case represents average emission rates for regional sources and average initial concentrations of the O_3 precursors VOC, NO_x, and CO for high O_3 days. Also, meteorological conditions for the base case are most representative of typical summer days in the study area. Conditions represented by Phx_sum2 and Phx_sum3 are observed less frequently than conditions represented by Phx_sum1 in the study area.

Regional and power plant emission data and sensitivity results are shown in Tables G-4 and G-5, respectively. Peak O_3 levels associated with TDM and LRPC power plant operations are predicted to decrease or increase, depending on whether conditions fall within the VOC- or NO_x-limited regime, respectively, on the VOC-NO_x-O_3 plot produced by the model. Such plots are shown in Figure G-1 for the base case, which falls in the VOC-limited regime, and for the Phx_sum3 case, which falls in the NO_x-limited regime of the model. The following is a summary of the results of the sensitivity analysis:

- Halving the source area (same as doubling the emission rates) increases the peak O_3 for the baseline (no plants operating) from 137.3 parts per billion (ppb) to 150.7 ppb. However, O_3 concentrations decrease up to 4.7 ppb with increasing NO_x and VOC emissions from the power plants (compared with no change for the base case), as results fall in the VOC-limited regime of the OZIPR plot. NO_x emissions increase when fewer selective catalytic reduction (SCR) systems are installed, while VOC emissions are the same for all plant configurations modeled. The baseline for all cases represents no plant emissions.

- Conversely, doubling the source area (same as halving the emission rates) decreases the baseline peak O_3 from 137.3 ppb to 128.3 ppb for the base case. Peak O_3 increases up to 1.5 ppb over the baseline with increasing emissions from the plants, as the conditions fall in the NO_x-limited regime of the OZIPR plot.

- For meteorological conditions with the lowest afternoon mixing height (Phx_sum2), peak O_3 concentrations are the highest, having a baseline of 166.8 ppb. However, peak O_3 concentrations fall up to 15.5 ppb from the baseline with increasing plant emissions, as the conditions fall in the VOC-limited regime of the OZIPR plot.

- For meteorological conditions with the greatest afternoon mixing height (Phx_sum3), modeled peak O_3 concentrations are the lowest, having a baseline of 99.2 ppb. Peak O_3 increases by up to 3.6 ppb over the baseline with increasing plant emissions, as results fall in the NO_X-limited regime of the OZIPR plot (e.g., see Figure G-1). Overall peak O_3 levels are reduced in this case, primarily because of dilution in the larger mixing volume.

- For the scenario in which the initial concentrations of NO_X and VOC are doubled (similar to doubled emissions), baseline peak O_3 concentrations increase to 165.9 ppb, while O_3 falls up to 9.4 ppb from the baseline with increasing plant emissions, as the conditions fall in the VOC-limited regime of the OZIPR plot.

- For the scenario in which the initial concentrations are halved, the baseline peak O_3 concentration decreases to 116.5 ppb, while O_3 rises up to 2.5 ppb over the baseline with increasing plant emissions, as the conditions fall in the NO_X-limited regime of the OZIPR plot.

- For the cases using VOC speciation data for Los Angeles and Houston, changes in peak O_3 concentrations from the base case are minor (less than 1 ppb), thus showing that the model is insensitive to this variable.

In summary, sensitivity analysis results predict that either increases or decreases in peak O_3 concentrations would result from plant emissions, depending on the input data set used. In general, the modeled increases in peak O_3 concentrations are substantially less than the modeled decreases in peak O_3 concentrations under the range of conditions examined in this sensitivity study. Cases that fall in the NO_X-limited regime exhibit increasing peak O_3 concentrations with increasing power plant emissions, but they still have much lower overall peak O_3 concentrations than those that fall in the VOC-limited regime. Cases that fall in the VOC-limited regime exhibit steady or decreasing peak O_3 concentrations with increasing power plant emissions. The base case, representing the most frequently observed model conditions in the region, falls into this category. In conclusion, sensitivity analysis shows that increases in O_3 concentrations from plant emissions would be limited to a few parts per billion under a reasonably wide range of model assumptions, while even greater reductions of peak O_3 concentrations would be possible under conditions that fall into the VOC-limited regime.

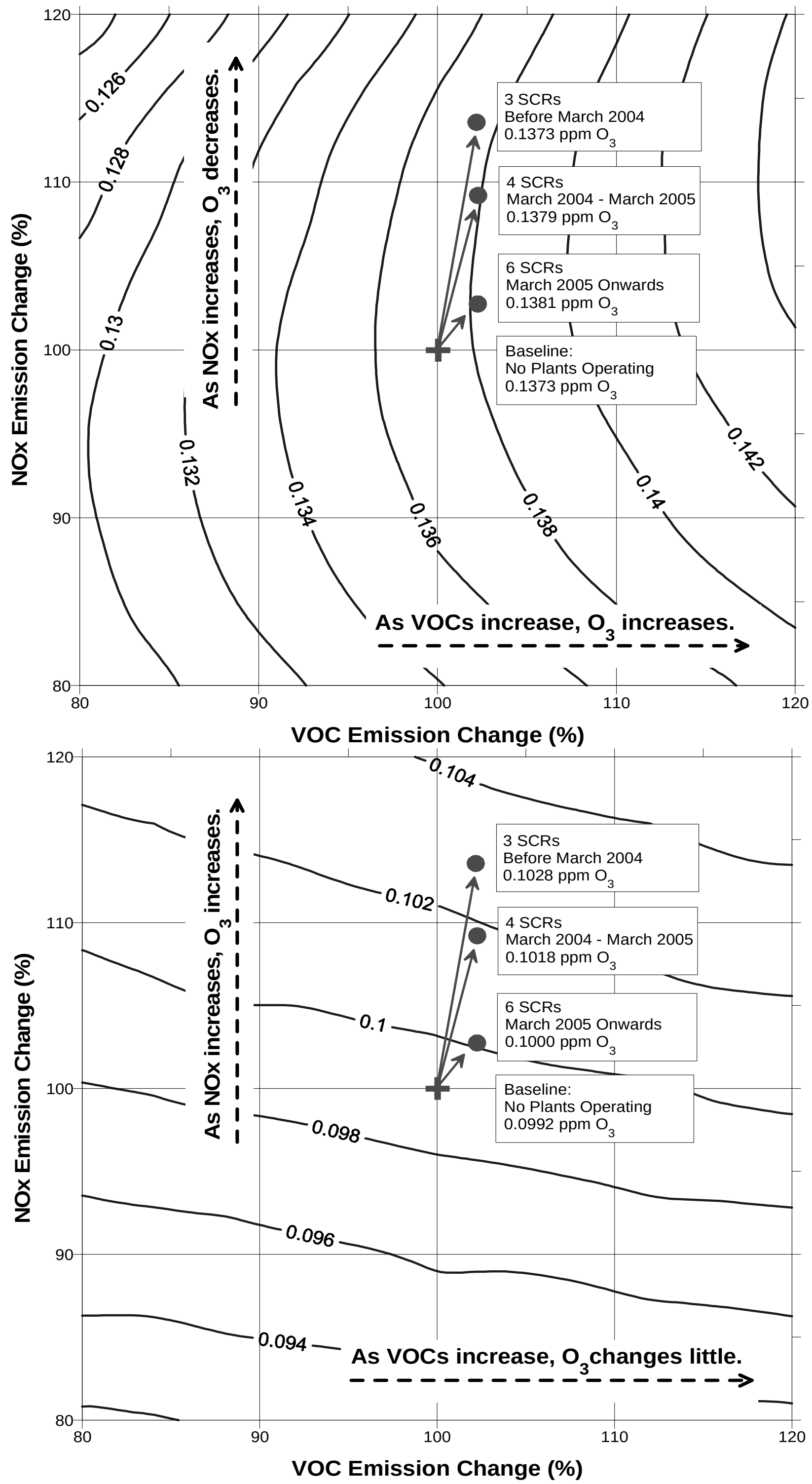

FIGURE G-1 Comparison of Base Case (top, VOC-limited regime) and Phx_sum3 Case (bottom, NO_x-limited regime)

TABLE G-4 Emission Rates for Imperial County in 2003 and Mexicali in 1999

	2003 Imperial County		1999 Mexicali			Imperical County and Mexicali		Emission Rate
Pollutant	(tons/yr)[b]	(tons/d)	(Mg/yr)	(tons/yr)	(tons/d)	(tons/yr)	(tons/d)	(kg/km²/h)[c]
VOC[a]	11,840.6	32.44	32,445.9	35,764.9	97.99	47,605.5	130.43	12.33
NO_x	12,939.3	35.45	10,692.9	11,786.7	32.29	24,726.0	67.74	6.40
CO	40,584.4	111.19	51,331.2	56,582.0	155.02	97,166.4	266.21	25.16

[a] Reported as reactive organic gases for Imperial County and as VOC for Mexicali.

[b] To convert short tons to metric tons, multiply by 0.9072.

[c] Assumed an area of 154 mi^2 (400 km^2).

TABLE G-5 Changes in Peak O_3 Concentrations (in parts per billion [ppb]) Associated with TDM and LRPC Power Plant Operations for Different Model Input Parameters

	TDM/LRPC					
	Emissions (tons/yr)[a]		Increase to Imperial County and Mexicali (%)		Base Case	
Scenario	NO_x	VOC	NO_x	VOC	Peak O_3	ΔO_3
3 SCRs	3,188.0	1,069.0	12.9	2.2	137.3	0.0
4 SCRs	2,328.5	1,069.0	9.4	2.2	137.9	0.6
6 SCRs	609.5	1,069.0	2.5	2.2	138.1	0.8
Baseline					137.3	

	Area = 200 km^2		Area = 800 km^2		Met = Phx_sum2		Met = Phx_sum3	
Scenario	Peak O_3	ΔO_3	Peak O_3	ΔO_3	Peak O_3	ΔO_3	Peak O_3	ΔO_3
3 SCRs	146.0	–4.7	129.8	1.5	151.3	–15.5	102.8	3.6
4 SCRs	148.5	–2.2	129.7	1.4	158.2	–8.6	101.8	2.6
6 SCRs	151.2	0.5	129.2	0.9	166.8	0.0	100.0	0.8
Baseline	150.7		128.3		166.8		99.2	

	Initial Concentrations × 2		Initial Concentrations × 1/2		LA: VOC Speciation		Houston: VOC Speciation	
Scenario	Peak O_3	ΔO_3	Peak O_3	ΔO_3	Peak O_3	ΔO_3	Peak O_3	ΔO_3
3 SCRs	156.5	–9.4	119.0	2.5	135.8	–0.2	135.0	–0.2
4 SCRs	160.3	–5.6	118.5	2.0	136.4	0.4	135.6	0.4
6 SCRs	166.4	0.5	117.5	1.0	136.7	0.7	135.9	0.7
Baseline	165.9		116.5		136.0		135.2	

[a] To convert short tons to metric tons, multiply by 0.9072.